REMARKS

Claims 1-17 are now present in the application. Claims 1, 2, 4-6, 10 and 12 have been amended and claims 15-17 have been added. Claims 1, 4 and 17 are independent. Reconsideration of this application, as amended, is respectfully requested.

Claim Objections

Claim 2 stands objected to for a minor informality. As the Examiner will note, claim 2 has been amended to change the word "is" to --in--. Accordingly, claim 2 is now in proper form. Reconsideration and withdrawal of the claim objection are respectfully requested.

Rejections Under 35 U.S.C. §§ 102 and 103

Claims 1-9 and 14 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Kodaira et al., U.S. Patent No. 6,233,059. Claims 10-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kodaira et al. in view of Imoto, U.S. Patent No. 5,246,948. These rejections are respectfully traversed.

The present invention is directed to an image recording method and apparatus. Independent claim 1 of the present invention is directed to the image recording method and requires a combination of steps including "adjusting a light quantity of light which is issued from a light source and incident on an original in accordance with the original type." Independent claim 4 of the present invention is directed to the image reading apparatus and requires a combination of elements including "light quantity balance adjusting means

... being provided between said light source and said original in accordance with the original type."

In the present invention, a light quantity adjusting filter 26 is exemplified by a filter having the spectral transmittance characteristic as shown in Fig. 8, which is the characteristic reverse to that of a color negative film base. In Kodaira et al.; the filter unit 404 is provided for canceling the negative base inserted at the time of scanning a negative film. The filter unit 404 of Kodaira et al. includes an ND filter for adjusting the luminous quantity reaching the CCD. However, the image reading apparatus disclosed in Kodaira et al. and the image reading apparatus of the present invention are different from each other with regard to the position in which the filters are caused to operate on the light path. Specifically, the filters in Kodaira et al. are arranged between the original and the lenses, while the light quantity balance adjusting means in the present invention is arranged between the light source and the original. Applicant respectfully submits that this difference is sufficient to patentably distinguish the present invention from Kodaira et al.

The above difference between the present invention and Kodaira et al. results in a difference in the effect of the present invention. Specifically, in Kodaira et al., the light quantity balance adjustment, or again, the light quantity adjustment with an ND filter is performed on the light emitted from a light source such as a white-light source and is then transmitted by an original. Accordingly, an original having an incomplete color balance, such as a negative film, is illuminated with the light component at a wave length, which realizes a higher transmittance (red component in the case of a negative film) intensively,

especially as compared with the present invention. Consequently, in Kodaira et al., color images on a film will be discolored earlier due to intensive light (light-faded).

Moreover, it is known that thermotropy, a phenomenon of density variation depending on the temperature, may be induced in negative films. Accordingly, if a halogen lamp is used as the light source and a near-infrared light component is not fully attenuated, such thermotropy may disadvantageously occur.

In the case of a negative film, the light transmitted by the film has an intensity decreasing in the order of the red component > the green component > the blue component because the negative film base is red. It is therefore necessary to increase the intensity of the transmitted light to enable a full reading of the blue component, so that the light quantity of the blue light component is sufficient. In that case, the light quantity of the red light component is also increased. As a result, the original will be illuminated with the red light component as such with a considerable intensity. In addition, the near-infrared light is rendered more intensive in proportion to the intensive red component with a large light quantity. Consequently, it will be highly possible that the temperature of the film as the original be elevated. Accordingly, thermotropy can occur.

Thus, in the case where the light quantity adjusting filters are arranged between the original and the lenses as in Kodaira et al., there is a strong possibility that thermotropy may be induced, because the light quantity of the light source is incident directly on the negative film as the original. On the other hand, in the present invention, the light quantity balance adjusting means is arranged between the light source and the original (negative film), and the red component and the near-infrared component which are incident on the

original (negative film) can be fully attenuated. Accordingly, thermotropy will never be induced, or will be induced only with a small possibility. This is the case, even if the light from the light source having the same light quantity as in Kodaira et al. is used.

If thermotropy is induced in an image reading apparatus the below adverse effects can occur. Specifically, upon reading a negative film in an image reading apparatus, prescanning is generally performed with a lower illumination intensity, while fine scanning is generally performed with a higher illumination intensity. This results in a stronger possibility of thermotropy being induced.

The determination of the reading light quantity used for fine scanning and the set-up operation are performed generally based on the image information read by prescanning. In this regard, the density of the fine scanned image is obtained by adding the exposure amount and the amount of density variation due to the thermotropy to the density of the prescanned image. In other words, in the configuration of the apparatus of Kodaira et al., it is necessary to modify the exposure amount corresponding to the density variation due to the thermotropy for the determination of the reading light quantity. For the set-up operation, it is necessary to incorporate such a device in the apparatus that corrects the density variation due to the thermotropy, so as to make the image processing parameters determined in the prescanning effective on the fine scanned images.

As described above, the image reading apparatus disclosed in Kodaira et al. and the image reading apparatus of the present invention are different from each other with regard to the position in which the filters are caused to operate on the light path and such difference results in distinct differences in effect between the two apparatus. In view of

this, Applicant respectfully submits that the Kodaira et al. reference fails to anticipate independent claims 1 and 4 of the present invention.

With regard to dependent claims 2, 3 and 5-14, Applicant respectfully submits that these claims are allowable due to their respective dependence on allowable independent claims 1 and 4, as well as due to the additional limitations recited by these claims.

With regard to dependent claim 14, this claim requires the recitation "wherein said peak value changing means of said spectral sensitivity distribution will not operate in a reference type of the original." In the Examiner's Office Action, the Examiner asserts that Kodaira et al. discloses this aspect of the present invention and therefore anticipates dependent claim 14. While not commenting on the appropriateness of the Examiner's rejection, it is pointed out that claim 14 depends on claim 11, which depends on claim 10. In view of this, dependent claim 10 requires the "spectral sensitivity changing means ..." recited in dependent claim 10.

In the Examiner's Office Action (page 5, paragraph 4), the Examiner recognizes that Kodaira et al. fails to disclose the "spectral sensitivity changing means ..." recited in dependent claim 10. Therefore, it is not understood how the Examiner can take the position that Kodaira et al. anticipates dependent claim 14, when the "spectral sensitivity changing means ..." of dependent claim 10 is also required by this claim. It is therefore respectfully requested that the Examiner clarify the rejection of dependent claim 14 under 35 U.S.C. § 102 in view of the Kodaira et al. reference.

With regard to dependent claims 10-13, the Examiner relies on Imoto. This reference has been utilized for a teaching of spectral sensitivity changing means recited in

claims 10-13. While not commenting on the appropriateness of the Examiner's rejection, Applicant respectfully submits that the Imoto reference fails to disclose an image reading method, including the step of "adjusting light quantity of light which is issued from a light source and incident on an original in accordance with the original type" or an image reading apparatus including "light quantity balance adjusting means ... being provided between said light source and said original in accordance with the original type" as required by independent claims 1 and 4, respectively. Accordingly, Imoto fails to make up for the deficiencies of Kodaira et al.

In view of the above amendments and remarks, Applicant respectfully submits that claims 1-14 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §§ 102 and 103 are respectfully requested.

Additional Claims

Claims 15-17 have been added for the Examiner's consideration. Applicant submits that additional claims 15 and 16 are allowable due to their dependence on independent claims 1 and 4, respectively, as well as due to the additional limitations recited by these claims.

With regard to additional independent claim 17, Applicant submits that this claim is allowable for the same reasons mentioned above with regard to independent method claim 1.

Favorable consideration and allowance of additional claims 15-17 are respectfully requested.

CONCLUSION

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Paul C. Lewis, Registration No. 43,368 at (703) 205-8000 in the Washington, D.C. area.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for

any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 15-17 have been added.

The claims have been amended as follows:

1. (Amended) An image reading method, comprising the steps of:

reading photoelectrically an original image with an image sensor by separating it into three primary colors; and

converting image signals of the three primary colors outputted from the image sensor into digital signals,

wherein a light quantity of light which is incident on said image sensor is balanced [with every color] among colors in accordance with an original type by adjusting said light quantity of light which is issued from a light source and incident on an original in accordance with the original type.

2. (Amended) The image reading method according to claim 1, wherein balancing said light quantity [with every color] among colors is formed by changing an optical balance [is] in an optical system from [a] the light source to the image sensor including [an] the original.

4. (Amended) An image reading apparatus comprising:

an image sensor which separates into three primary colors light bearing an image of an original and photoelectrically reads said light[,];

[an] original type acquiring means for detecting or setting an original type of said original; and

light quantity balance adjusting means for catching [with every color] among colors a balance of light quantity of said light that is incident on said image sensor in accordance with the original type obtained by said original type acquiring means by adjusting light quantity of light which is issued from a light source and incident on an original in accordance with the original type, said light quantity balance adjusting means being provided between said light source and said original in accordance with the original type.

5. (Amended) The image reading apparatus according to claim 4, wherein said light quantity balance adjusting means changes an optical balance in an optical system from [a] the light source to the image sensor including said original.

6. (Amended) The image reading apparatus according to claim 4, wherein said light quantity balance adjusting means changes [the] an optical balance in [the] an optical system from the light source to the image sensor including said original and decreases color mixing in the three primary colors.

10. (Amended) The image reading apparatus according to claim 4, further comprising:

spectral sensitivity changing means for changing a spectral sensitivity distribution of said light in accordance with the original type after the balance of the light quantity is adjusted [with every color] among colors, as well as said respective means.

12. (Amended) The image reading apparatus according to claim 11, wherein said peak value changing means of said spectral sensitivity distribution changes a peak value of the spectral sensitivity distribution in an optical system from [a] the light source to the image sensor including said original.